

# UNIVERSITY OF HAWAII

# CONCESSION-MAKING IN EXPERIMENTAL NEGOTIATIONS

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PREDICTIVE MODEL FOR INTRA-GROUP NEGOTIATION

conducted at the University of Hawaii by
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TABLE OF CONTENTS

## Abstract

Two seemingly contradictory hypotheses about concession-making were considered: that concession-making occurs only as a result of own failure (experienced when opponent lowers his offers), and that it occurs only as a result of reciprocity (as a reaction to opponent's concession-making). A total of 87 five-man experiments, bearing upon these hypotheses, were conducted. The findings were somewhat unexpected in that they suggested that opponent's behavior determines a negotiator's behavior far less than one might expect: by and large, a negotiator's demands depended on his own previous demands. To the extent, however, to which opponents' behavior was influential, the "reciprocity" hypothesis appeared to be more nearly correct than the "failure" hypothesis. It was found, furthermore, that concession-making tended to be a rather bad strategy, that a negotiator making few concessions tended to receive higher payoff than the negotiator who made many concessions.

In accounting for the findings, it was shown that the deadline could play an important role in determining the final payoff, and that , were the time alloted for negotiation much shorter, concession-making might have been a more profitable strategy that it actually was.

# CONCESSION-MAKING IN EXPERIMENTAL NEGOTIATIONS*

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Perhaps due to the prominence that negotiation has gained as a means for settling international and labor-management conflicts, an interest in negotiation has been growing within several disciplines. A number of models of bargaining and arbitration has been formulated by authors trained in economics and mathematics,[1] case studies of the actual negotiation process have been made by sociologists, psychologists and political scientists,[2] experiments in bargaining and negotiation are being conducted by behavioral scientists of various backgrounds.[3] The accomplishments of these efforts have been many and our understanding of the negotiation process has increased considerably. And yet, curiously enough, a question that is of considerable practical importance and which has been a subject of some theoretical speculation[4] has not been approached in a systematic fashion until recently:[5] Is making concessions a good negotiation strategy, or is it better to make few if any concessions?

## Some Views on Concession-Making

Whether concession-making is a good strategy of negotiation has been a subject of heated controversy in recent years. However, as often happens in heated debates, the most fundamental question that should be answered before the controversy can be resolved has not always been asked:

good for what? For it is perfectly possible that concession-making is a good strategy in the sense that it gets negotiations moving, that it overcomes deadlocks, that it leads to an agreement, and yet it still can be a bad strategy in the sense that the final payoff that goes to the negotiator who always originates concession-making is unfairly low. In other words, while making concessions may effectively reduce tensions, it need not lead to a fair agreement.

Even the briefest review of the scholarly literature reveals that our theoretical and empirical knowledge is not sufficient to suggest whether, first of all, concessions usually generate concessions, and, second of all, whether the negotiator who makes concessions finds this strategy rewarding when the final agreement is reached.

Concession-Making and the Opponent: Two Opposite Views.

It is a curious fact that two of the most outstanding theories dealing with concession-making appear to reach exactly opposing conclusions: the theory outlined by Siegel and Fouraker (1960) seems to imply that an opponent will make concessions only if his opponent does not make any, while Osgood's (1960) theory of graduated reciprocation in tension reduction suggests that concession-making cannot fail to bring about concession-making by the opponent.

Siegel and Fouraker's view is suggested both by the social psychological theories dealing with the level of aspiration and by the experiments conducted by the authors. The authors seem to argue that a negotiator makes a concession only if he experiences a failure (if his opponent makes exceptionally low offer); if he experiences success (his opponent makes an exceptionally generous offer), a negotiator will not make a concession, he may actually increase his demands. Underlying this view

is the theory that success raises one's level of aspiration, failure lowers it, and that the demands the negotiator makes reflect his level of aspiration.[6] The implication of the Siegel and Fouraker's view seems to be that a negotiator who wishes to maximize his own payoff should not make concessions.

Osgood, on the other hand, maintains that just about the only way a negotiator can induce his opponent to make concessions is to make concessions himself. The underlying conception seems to be that the main reason why an opponent fails to make concessions is distrust, the fear that his concessions will not be reciprocated. By being the first who makes the concession, the negotiator lessens this distrust and thereby removes the main obstacle to opponent's concession making. While there are many qualifications with which this view is held -- for example, Osgood argues that the first step should involve a small concession and that further concessions should be made only if the first one is reciprocated -- the theory seems to imply that a concession-making negotiator cannot fail to induce concessions by his opponent.[7]

## Concession-Making and the Opponent: A Model

It is useful to make explicit some of the assumptions that are implicit in the theories advanced by Siegel and Fouraker on one hand and Osgood on the other. This can be done by means of a mathematical model which is general enough to encompass both theories and simple enough to be easy to test. Since both theories make hypotheses (albeit different ones) about the manner in which a negotiator reacts to the offers made to him by his opponent, we can assume that the relationships

in question are linear and write

$$(1) \qquad Y = a + b_0X_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4$$

The reader will recognize this equation as equivalent to a linear regression equation with five independent variable $X_0$, $X_1$, ..., $X_4$, five regression coefficients $b_0$, $b_1$, ..., $b_4$ and slope intercept a. The reader familiar with Richardson's (1960) model of the arms race, will recognize the above equation as a version of that model.[8]

In having five independent variables in eq. (1) we are anticipating the description of our experiments:[9] in all our experiments there were five negotiators trying to reach an agreement, so that each negotiator i had four colleagues j=1, ..., 4. The variables $X_1$, ..., $X_4$ then represent the <u>offers</u> made to a given negotiator i by his four colleagues, j=1, 2, ..., 4. It should be added that the four colleagues are assumed to speak always in the same order, j=1 speaking first, j=2 second, ..., j=4 fourth. Finally, variable $X_0$ refers to i's own <u>demand</u> when he spoke last time (just prior to j=1's speaking), and Y refers to i's own demand "now", (just after j=4's speaking), this demand being the variable we wish to predict.

It is perhaps clear that coefficients $b_j$ specify the relationship between j's past offers and i's present demand. If, for example, all $b_j$ ($j \neq 0$) were in fact positive, then it would mean that the negotiator responds to a high offer by making a high demand-- which, it will be recalled, is consistentwith Siegel and Fouraker's theory. If, on the other hand, at least some of the coefficients were found to be negative, then Osgood's theory would be verified, for it would mean that the negotiator was responding to high offers by making low demands. That this is predicted by Osgood's theory becomes obvious when we realize that a

high offer from a colleague who is in fact negotiator's "natural opponent" has to be interpreted as a low demand by that opponent: In our usage, two negotiators are natural opponents if their payoffs are negatively related so that a high payoff for one means automatically a low payoff for the other. This being the case, then obviously, by definition, a low demand will be perceived by a natural opponent as a high offer. Hence, if we know that j is i's natural opponent and that j made a high offer to i, we know that, ipso facto, j made a low demand for himself. Now if Osgood's theory is correct and i reciprocates, then he must respond to j's low demand by making a low demand also. Hence we conclude that, if Osgood's theory is correct, the regression coefficient $b_j$, when j is a natural opponent, has to be negative, i has to respond to opponent's high offers by making low demands. Since Siegel and Fouraker theory predicts positive coefficients in all cases, the question whether $b_j$ is negative when j is a natural opponent becomes a crucial test for the two theories.

Concession-Making and the Final Payoff.

Siegel and Fouraker hypothesized and confirmed in their experiments that the payoff a negotiator receives depends on his "level of aspiration": the higher his level of aspiration, the higher his final payoff.[10] Since those negotiators who maintain throughout the negotiation a high level of aspiration are also, by definition, the very negotiators who make only very few concessions, the Siegel and Fouraker's work seems to suggest that concession-making is a bad strategy since it is associated with a low final payoff.

Upon closer examination of the problem, however, one begins to wonder whether such a conclusion is justified. The crucial fact about

the Siegel and Fouraker's experiments is that there were very few cases in which the negotiators failed to reach an agreement.[11] What the authors call "level of aspiration" corresponds to our "demand", and, quite obviously, the final payoff a negotiator receives if a session ends in an agreement corresponds to his final demand. Now if it is true that negotiator A's demands are uniformly higher than B's demands, then it must be also true that A's very last demand is higher than B's last demand. And thus we see that if we stipulate that A's demands be uniformly higher than B's demand and that an agreement has to be reached, it follows -- in a completely tautological sense -- that A's final payoff must be higher than B's final payoff.

It should be emphasized that Siegel and Fouraker themselves never concluded that concession-making is a bad strategy, that their theoretical concern was with establishing whether level of aspiration was an important variable in negotiation. But our point is that their findings could be easily misinterpreted as having these implications. In order to study the true significance of concessions-making -- and of the level of aspiration as well, in our opinion, -- one has to avoid the above mentioned tautology. And this can be done only if the negotiators are free to break off negotiations whenever they so desire and if such outcomes occur fairly often. The final payoff that is of particular interest, then, is the payoff the negotiators receive not only in the cases when they reach an agreement, but also in the cases when they fail to reach an greement. The answer to the resulting problem is by no means predetermined in a tautological fashion: if negotiations fail fairly often and a failure has itself a definite payoff, is concession-making a good or a bad strategy?

## Experiments

Although two different designs were used in the experiments, the "abstract" and the "spoken" design, both designs had much in common. Each experimental session involved five subjects (usually undergraduate students) who were instructed to reach a unanimous agreement with respect to a set of proposals. More precisely, their job was to single out one proposal (or, in some experiments, one combination of proposals) as constituting the content of their unanimous agreement. In each case the subjects knew that there was a definite deadline -- one or two hours -- by which they had to reach an agreement. If they reached an agreement, each negotiator received or lost some money; if they failed to reach an agreement, nobody received nor lost any money.

The manner in which the subjects were paid was an intrinsic part of the negotiation situation. Each subject was given (prior to the beginning of the session) his payoff function, a column of numbers indicating how much money he would be paid if one of the permissible agreements were reached. To illustrate, a typical payoff matrix used in the "abstract" experiments is shown in Table 1. Notice that in the experiment in which the payoff matrix of Table 1 was used there were 20 permissible proposals and that each subject knew his payoff for each proposal. For example, the subject whose experimental name was ALGO$^{12}$ knew that if proposal 9 were to be unanimously agreed upon, he would receive (after the experiment has terminated) $1.00.

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Insert Table 1 about here.

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TABLE 1.

One of the Payoff Matrices Used

in the "Abstract" Experiments.

| | Payoff to: | | | | |
|---|---|---|---|---|---|
| Proposal | ALGO | ERGA | INGO | OMNE | UTRO |
| 1 | $1.20 | $1.30 | $1.40 | $1.50 | $1.10 |
| 2 | $2.90 | $1.70 | $ .60 | $1.90 | $1.00 |
| 3 | $ .70 | $3.80 | $2.20 | $ .90 | $4.40 |
| 4 | $1.30 | $1.40 | $1.50 | $1.10 | $1.20 |
| 5 | $1.40 | $1.50 | $1.10 | $1.20 | $1.30 |
| 6 | $4.40 | $ .80 | $3.30 | $2.90 | $ .80 |
| 7 | $2.20 | $2.20 | $ .80 | $6.00 | $6.00 |
| 8 | $1.40 | $1.20 | $1.30 | $1.40 | $1.50 |
| 9 | $1.00 | $6.00 | $5.10 | $ .60 | $ .90 |
| 10 | $2.50 | $1.90 | $ .70 | $4.40 | $2.90 |
| 11 | $3.20 | $1.00 | $1.90 | $3.80 | $2.50 |
| 12 | $5.10 | $ .70 | $4.40 | $2.20 | $1.90 |
| 13 | $3.80 | $ .90 | $2.50 | $5.10 | $2.20 |
| 14 | $1.50 | $1.10 | $1.20 | $1.30 | $1.40 |
| 15 | $ .90 | $5.10 | $3.80 | $ .70 | $3.30 |
| 16 | $ .60 | $3.30 | $1.70 | $1.00 | $ .60 |
| 17 | $ .80 | $4.40 | $2.90 | $ .80 | $3.80 |
| 18 | $1.90 | $2.50 | $ .90 | $3.30 | $5.10 |
| 19 | $1.70 | $2.90 | $1.00 | $2.50 | $ .70 |
| 20 | $6.00 | $ .60 | $6.00 | $1.70 | $1.70 |

Notice that, as a rule, different subjects had different payoff for the same proposal. But -- and this is another important feature of our experiment -- the negotiator never knew this. In fact, all he ever knew was his own payoff function, he was never given the functions of his opponents. Since the subjects were not allowed to reveal their own payoff functions, each negotiator could only guess at what his opponent's functions were.

The difference between the "abstract" and the "spoken" design was introduced for theoretical reasons: in the abstract design the amount of communication between the subjects was severely restricted, thus allowing us to gather a large number of individual endorsements and to study endorsements without the effect of possibly distracting discussion; in the "spoken" design the subjects were allowed to say essentially whatever they pleased, thus allowing us to check whether the conclusions valid for the restricted conditions hold also for the more "realistic" conditions.

More specifically, in the abstract design the subjects arrived to the session unprepared. They were seated in a circular fashion behind specially constructed desks,[13] and the session started with subject assigned the seat of ALGO. As the first speaker, ALGO would only state a number, say "12", thereby indicating that he was ready, at that time, to agree with others on the proposal number 12. Thus a "speech" in the abstract experiments had no content to it other than the number by which it was identified (say, number 12) and the payoff it had for the various negotiators. As soon as ALGO stated his preference, it was ERGA's turn to speak, who again stated a number. And so on. The same speaking order was preserved throughout the session: ALGO, ERGA, INGO, OMNE, UTRO, ALGO ..., the session ending when five consecutive speakers endorsed the same proposal.

The spoken design differed from the abstract in that previous preparation was required of the subjects. Before coming to the experiments, each subject was given a dossier informing him about the role he was to play in the experiments. In some experiments he played the role of a head of state (the role of Kennedy, Khruschev, Mao Tse-Tung, De Gaulle, or Mac Millan), in others the role of a U. S. Senator (such as the Senator from Vermont). The dossier specified not only what the proposals to be discussed were and what payoff he was to receive from each proposal, but also what argument he may wish to use in defending the proposals with high payoff for him and in attacking those with low payoff for him.

In all spoken experiments there were only four or five proposals on the agenda, such as the proposals shown in Table 2. Prior to assigning a role to a negotiator, his personal preferences with respect to the items on the agenda were ascertained by a questionnaire, and the assignment was made so that the subject's private preferences corresponded with his monetary payoffs as much as possible. The session itself proceeded in the manner analogous to that used in the abstract experiments, except that, in addition to stating his preference, the speaker was allowed to make any arguments he wished to support his position. Furthermore, the speaker could endorse any one of the possible "package deals", any one of the combinations that could be made from the proposals on the agenda. The payoff from a package deal was simply the sum of the payoffs associated with the proposals included in the package.

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Insert Table 2 about here.

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TABLE 2.

One of the Payoff Matrices Used

in the "Spoken" Experiments

| | | Payoff to: | | | | |
|---|---|---|---|---|---|---|
| | Proposal | CHINA | USSR | G.B. | USA | FRANCE* |
| 1 | Total Disarmament | -$ .50 | $3.50 | -$ .50 | -$ .50 | $ .50 |
| 2 | Ban on Nuclear Testing | -$ .50 | $2.50 | $3.50 | -$ .50 | $ .50 |
| 3 | Inspection Stations | -$1.50 | -$1.50 | $2.50 | $3.50 | $ .50 |
| 4 | UN Police Force | -$3.00 | -$ .50 | $ .50 | $2.50 | $ .50 |
| 5 | Destruction of nuclear stockpiles | $3.50 | -$ .50 | -$1.50 | -$1.50 | $ .50 |

*France was a "mediator", hence payoff to her was governed by special rules: France's payoff depended on the time when agreement was reached, not on what the agreement was.

## Findings

The main findings reported in this paper are based on 87 experiments, 73 of them involving the "abstract" negotiations, 14 the "spoken" negotiations. The data gathered in the experiments were analyzed so as to answer two basic questions: Is there a general tendency for the concession-making to be reciprocated? And, does concession-making lead to a good -- or at least fair -- final payoff?

### Concession-Making and the Opponent: Main Findings

As was indicated above, the test of the hypothesis that concession-making is usually reciprocated (the Osgood hypothesis) is contingent upon distinguishing between negotiators who are "natural allies" from those who are "natural opponents": the hypothesis is correct only if the relationship between negotiator's demands and his opponent's offers is negative, i.e., only if $b_j < 0$ whenever j is an opponent.[14] Before we could proceed with testing this hypothesis, however, we had to develop a measure of alliance, one that would enable us to separate allies from opponents. We adopted the perhaps most logical measure, the coefficient of correlation between a given i's payoff function and a given j's payoff function, and called the resulting coefficient the coefficient of alliance, $r_{ij}$. Thus, for example, to compute the coefficient of alliance between ALGO and ERGA in Table 1, we correlated the first two columns of the table, thus obtaining the coefficient of alliance $r_{AE} = -.64$, a coefficient indicating that ALGO and ERGA were "natural" opponents.

The basic data to be presented are the coefficients $b_1, \ldots, b_4$ of equation (1). To distinguish these four coefficients (that specify negotiator's reaction to his colleagues' offers) from $b_0$ (which specifies how much his own previous demand is taken into account), we shall call the four coefficients $b_1, \ldots, b_4$ the reaction coefficients. As is suggested by the form of eq. (1), the estimation of the reaction coefficients was technically simple even though the amount of computation required was considerable:[15] the endorsements of the negotiators, as these actually occured in a given session, were used as a basis for a linear multiple regression analysis. The regression coefficients associated with the variables $X_1, \ldots, X_4$ thus provided the estimates of the reaction coefficients for a given negotiator i.

To compile tables 2 and 3, we noticed merely whether a given regression coefficient was positive or negative[16] and whether the two negotiators for whom the given coefficient applied were natural allies (the coefficient of alliance, $r_{ij}$, being positive) or natural opponents ($r_{ij}$ being negative). The 73 "abstract" experiments yielded a total of 876 reaction coefficients (Table 3), the 14 "spoken" experiments a total of 224 reaction coefficients (Table 4).

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Insert Tables 3 and 4 about here.

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The inspection of the data of Table 3 suggests, first of all, that the Osgood theory holds in the abstract sessions: while among the natural allies the majority of the reaction coefficients is positive, among the natural opponents the majority of them is

TABLE 3.

Distribution of Reaction Coefficients, $b_j$, among Natural Allies and Natural Opponents; Abstract Sessions Only.

| | | Natural Allies* | Natural Opponents | Total |
|---|---|---|---|---|
| Reaction Coefficients, $b_j$ | Positive | 77% | 44% | 59% |
| | Negative | 23% | 56% | 41% |
| Total | | 100% (384) | 100% (492) | 100% (876) |

*Natural Allies are the negotiators whose coefficient of alliance, $r_{ij}$, is positive.

TABLE 4.

Distribution of Reaction Coefficients, $b_j$, Among Natural Allies and Natural Opponents; Spoken Sessions Only.

| | Natural Allies* | Opponents | Total |
|---|---|---|---|
| Reaction Coefficient, $b_j$ | 60% | 51% | 55% |
| | 40% | 49% | 45% |
| | 100% (84) | 100% (140) | 100% (224) |

*Natural Allies are the negotiators whose coefficient of Alliance, $r_{ij}$, was positive.

negative, just as predicted by the theory. Moreover, these deviations from 50% are sufficiently large so that they could not have occured by chance (significant beyond the .001 level). For the spoken sessions, however, while positive coefficients occur more often among allies than among opponents, the percentage of negative coefficients among the opponents is about 50% (Table 4). Thus the findings for the spoken experiments are inconclusive.

The curious fact about the findings is, however, that the Siegel and Fouraker theory is supported also. There is a general tendency for the reaction coefficients to be positive, as shown both by the fact that the total number of positive coefficients found is significantly larger than 50% (59% for Table 3, 55% for Table 4) and by the fact that in Table 3 the percentage of positive coefficients among allies, 77%, is much higher than the percentage of negative coefficients among opponents, 56%. We are thus drawn to the conclusion that, in our negotiations, the subjects tended to respond to high offers by making high demands while at the same time reciprocating concessions by concessions. We shall interpret this seeming paradox later.[17]

Concession-Making and the Opponent: Further Analysis.

Although the deviations from the 50% baseline are statistically significant in the comparisons based on Table 3, they are nevertheless so close to 0 as to raise a question that was ignored up to this point: just how much effect does the behavior of a colleague have upon the concession-making of a negotiator? So far we have tacitly assumed that such an effect exists and is

of practical importance -- but is this justified? Which leads to an even more general query: just how good is the model described by eq. (1)? Does it predict the demands of the negotiators with sufficient accuracy?

In order to answer these questions, we standardized the demands and offers occuring in a given group[18] and submitted a whole set of groups -- the set including all groups that used the same payoff matrix -- to the regression analysis. In this manner we obtained "average" values for all coefficients and could express the behavior of the subjects in terms of equation (1). Since this "average" equation is based on a large number of cases, we can investigate with considerable confidence the question of goodness of fit between the model of eq. (1) and the actual behavior of the subjects.

Table 5 contains some values for the group using the matrix displayed in Table 1. We see, for example, that ALGO in our experiment was characterized by

$$Y_{ALGO} = .17 + .49X_{ALGO} - .10X_{ERGA} + .07X_{INGO} + .02X_{OMNE} + .04X_{UTRO}$$

i.e., that ALGO tended to make demands that were about one-half of his own previous demand ($b_0 = .49$), reacted to ERGA's high offers by making low demands ($b_1 = -.10$), to everybody else's high offers by making high offers. We also note in Table 5 that ALGO and ERGA were natural opponents ($r_1 = -.64$) and so were ALGO and UTRO ($r_4 = -.12$).

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Insert Table 5 about here.

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TABLE 5.

Multiple Regression Analysis of 30 Abstract Experiments,

Using the Payoff Matrix of Table 1.

| Role | Reaction Coefficients | | | | | | Coefficients of Alliance | | | | Proportion of Variance Explained | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | a | $b_0$ | $b_1$ | $b_2$ | $b_3$ | $b_4$ | $r_1$ | $r_2$ | $r_3$ | $r_4$ | $r^2_{Y(1234).0}$ | $r^2_{Yo.1234}$ | $R^2_{Y.01234}$ | N |
| ALGO | .17 | .49 | -.10 | .07 | .02 | .04 | -.64 | .45 | .42 | -.12 | .02520 | .23458 | .30167 | 3341 |
| ERGA | .30 | .53 | .03 | -.07 | .04 | .04 | .21 | -.40 | .23 | -.64 | .00910 | .27534 | .30289 | 3341 |
| INGO | .28 | .44 | -.01 | .00 | .12 | .05 | -.30 | -.15 | .45 | .21 | .02998 | .19291 | .24987 | 3341 |
| OMNE | .28 | .48 | .06 | .07 | .04 | -.06 | .43 | .42 | -.40 | -.30 | .01997 | .22674 | .27571 | 3341 |
| UTRO | .14 | .53 | .01 | .11 | -.04 | .15 | -.12 | .23 | -.15 | .43 | .08318 | .28903 | .43035 | 3341 |
| Mean | .23 | .49 | — | — | — | — | — | — | — | — | .03349 | .24372 | .31210 | — |

While the actual values of the coefficients of regression are of considerable interest in themselves, of particular importance are the indices under the heading "Proportion of Variance Explained". We note that the five independent variables, $X_0$, ..., $X_1$ explain[19] about 31% of the variance of Y ($R^2_{Y.01234}$ = .31210 on the average), thus sugggesting that the fit between eq. (1) and the actual behavior of the subjects, although far from being perfect, is relatively high as sociological data go.[20] Furthermore, we note that the negotiator's own previous demand, $X_0$, alone[21] explains much more than the four offers $X_1$, ..., $X_4$ do jointly:[22] $X_0$ explains alone about 24% ($r^2_{Y0.1234}$ = .24372) of the variance, $X_1$, ..., $X_4$ jointly explain only about 3% ($r^2_{Y(1234).0}$ = .03349) of the variance. Thus we see that, by and large, our subjects tended to ignore the offers of their colleagues and were guided primarily by their own previous demands.

Table 6 shows similar data for the spoken sessions utilizing the matrix of Table 2. We see that the fit resulting from eq. (1) is much worse, that only about 18% of the variance in Y is explained by variables $X_0$, ..., $X_4$ ($R^2_{Y.01234}$ = .17513 on the average). But we do see that, again, the negotiator's own previous demands, $X_0$, explains much more alone (about 14%) than do all four offers combined (about 2%). We shall deal with the question of why the fit is worse in spoken experiments than in abstract experiments at a later time.[23]

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Insert Table 6 about here.

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**TABLE 6.**

**Multiple Regression Analysis of 7 Spoken Experiments,**

**Using the Payoff Matrix of Table 2.**

| Role | Intercept | Regression Coefficients | | | | | Coefficients of Alliance | | | | Proportion of Variance Explained | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $a$ | $b_0$ | $b_1$ | $b_2$ | $b_3$ | $b_4$ | $r_{i1}$ | $r_{i2}$ | $r_{i3}$ | $r_{i4}$ | $r^2_{Y(1234).0}$ | $r^2_{Y0.1234}$ | $R^2_{Y.01234}$ | N |
| CHINA | -.06 | .61 | .01 | .00 | -.06 | -.04 | -.13 | -.53 | -.75 | — | .00927 | .10753 | .12213 | 499 |
| USSR | .23 | .51 | .03 | -.07 | .08 | .04 | .18 | -.31 | — | -.13 | .02420 | .25774 | .28958 | 499 |
| G. BRITAIN | .15 | .35 | -.04 | .08 | -.05 | .13 | .52 | — | -.53 | .18 | .02124 | .12769 | .18407 | 499 |
| USA | .47 | .25 | .00 | .04 | .07 | .15 | — | -.75 | -.31 | .51 | .03645 | .04681 | .10472 | 499 |
| FRANCE* | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Mean | .20 | .43 | — | — | — | — | — | — | — | — | .02279 | .13494 | .17513 | — |

*France was not counted, since her payoffs did not vary from proposal to proposal (see Table 2).

Concession-Making and the Final Payoff.

To determine whether concession-making is a profitable strategy, we had to have two measures for each subject who participated in the experiments: a measure of his concession-making, and a measure of his final payoff. After considering various measures of concession-making, we finally decided that the simplest measure was the best,[24] the mean demand by the negotiator. More specifically, we associated with each endorsement, made by a given negotiator, the payoff he would receive if this endorsement was accepted by all others, thus obtaining a series of demands. The mean of these demands then constituted the measure of concession-making, since, a person who made many concessions (which includes the case when a negotiator starts by making a very low demand, the low opening demand being itself a concession) had to have a low mean demand. The measure of the final payoff was, obviously, the amount of money the negotiator was actually paid -- including 0 in the case when no argument was reached.

Three coefficients of correlation are of particular interest for our purposes. The coefficient of correlation between a negotiator's concession-making (his mean demand) and the outcome of reaching an agreement (agreement = 1, no agreement = 0), $r_a$; the coefficient between a negotiator's concession-making and his final payoff in groups that reach agreement, $r_b$; and the coefficient between a negotiator's concession-making and his total final payoff (whether or not the group reached an agreement), $r_c$. These three coefficients were computed by standardizing both the mean demand and the final payoff,[25] and are

$r_a = -.14$ $r_b = .27$ $r_c = .07$

Of the three coefficients, the second is fairly high and positive, $r_b = .27$, showing that in sessions that ended in an agreement the negotiator who made few concessions (had a high mean demand) usually received a higher final payoff than the negotiator who made many concessions (had a low mean demand). The first coefficient is negative, $r_a = -.14$, indicating that the fewer concessions a negotiator was making, the less likely was his group to reach an agreement. What is particularly interesting is the fact that the disadvantage of concession-making outweighs its advantages: the absolute size of $r_a$ is greater than that of $r_b$, suggesting that concession-making is, in the final analysis, a bad strategy. This conclusion is supported by the fact that the third coefficient is positive, $r_c = .07$, thus indicating that the negotiator who made large concessions could expect to make a somewhat lower payoff than the negotiator who made small concessions.

Although the three coefficients $r_a$, $r_b$, and $r_c$, are fairly low, they are all significant at or beyond the .05 level, due to the fact that the total number of cases is large, $N = 648$ for $r_a$ and $r_c$, $N = 485$ for $r_b$. Given the large number of cases used in the analysis, it is possible to gain some insight into the shape of the relationship between concession-making and the three types of outcome under discussion. Figure 1 shows these relationships.

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Insert Figure 1 about here.

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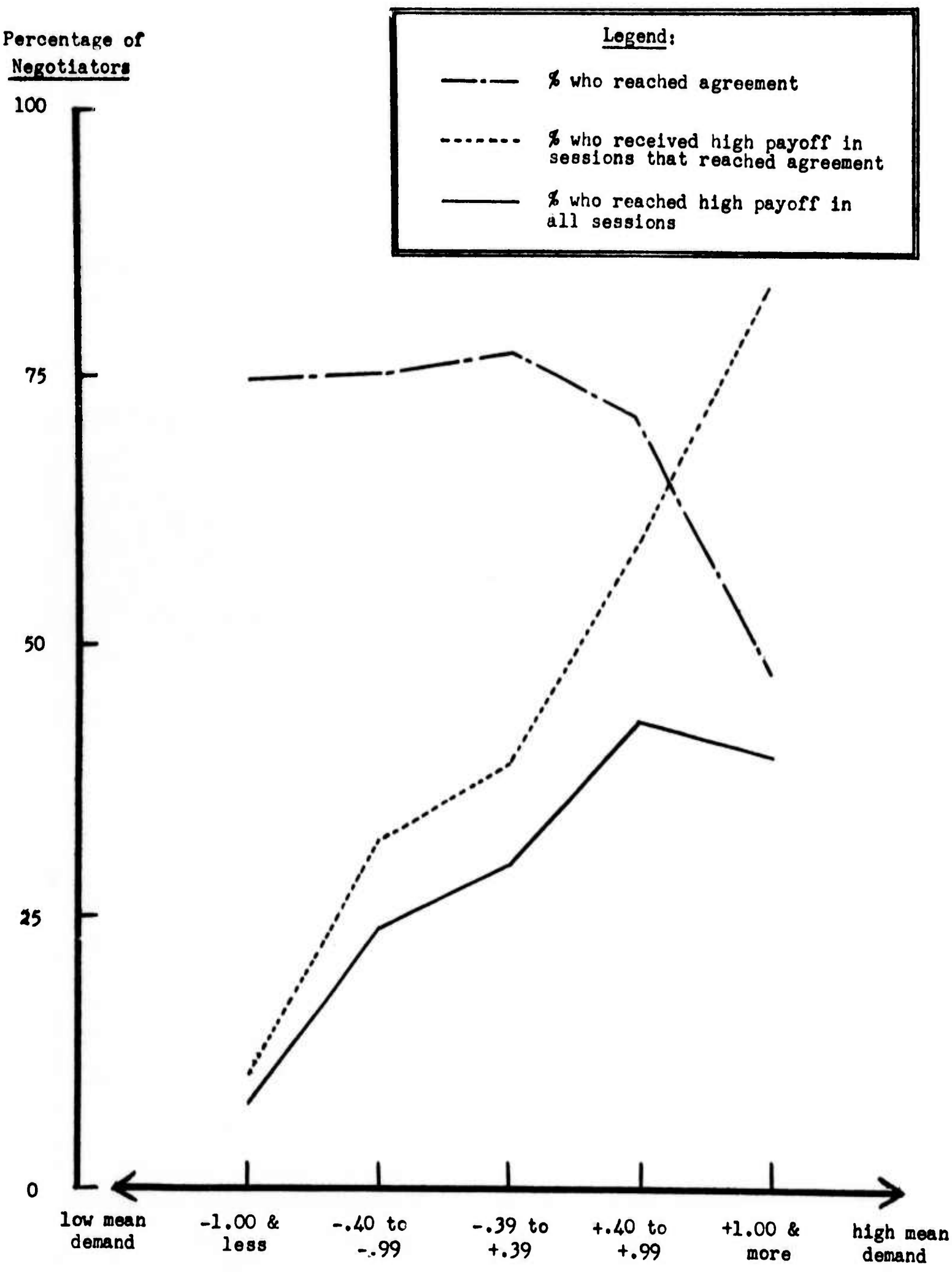


FIGURE 1. Relationship between Mean Demand and the Final Outcome.

The perhaps most thought-provoking fact about Figure 1 is that the probability of reaching an agreement is fairly unresponsive to the increases in mean demand, except for the high mean demand, i.e., except when the negotiator becomes extremely stubborn and makes only very few concessions. (By "extremely stubborn" we mean a negotiator whose mean demand was 1.00 or more standard deviations above the mean demands made by "his" group, i.e., the negotiators who used the same matrix and played the same role). Notice that the probability of agreement remains at around .77 until the Z-score of +1.00 or more is reached; but at that point it drops to about .46.

This is perhaps the crucial fact about Figure 1, for it can be used to explain the relationship we are particularly interested in, the relationship between the final payoff and concession-making (shown by solid line): this relationship, as we move from low to high mean demand, is at first influenced only by the fact that the final payoff increases as mean demand increases (the dotted line); however, as we move to the extremely high mean demand, this relationship is influenced also by the fact that, as mean demand becomes extremely high, the probability of agreement drops rapidly (broken line). As a result of these dual influences, the solid line neither raises continually (as does the dotted line) nor drops suddenly at the extreme right (as does the broken line), but rather rises at first and then drops slightly.

The practical conclusion suggested by Figure 1 is that the negotiator who wished to make a higher than average payoff, was well-advised to make fewer concessions than were typically made by those playing his role, but that he should have avoided being extremely

uncooperative, because by so doing he was drastically reducing the chances of agreement and hence also reducing his own expected payoff. It is in this sense that concession-making is shown as an unprofitable strategy.

## Discussion

The findings presented on the preceeding pages may be interesting and instructive in themselves, but are, at the same time, sorely in need of some interpretation. Recall that in approaching the question of concession-making we have tacitly assumed -- as have many authors in the past -- that the behavior of others can be influenced by what we ourselves do. And yet, in our experiments we found that our subjects were overhelmingly "introverted", that their demands were primarily determined by their own past demands and that they paid little attention to others' offers. Furthermore, we assumed implicitly that either Osgood's theory or the Siegel-Fouraker theory -- but not both -- can be true, and yet we found that some findings support the first while others support the second theory. How can these seeming inconsistencies be reconciled?

### A Theory of Concession-Making

The first assumption in our interpretation suggests that, when dealing with negotiation, one should have in mind a three-fold rather than a two-fold classification of relationship between negotiators. One should always assume that a negotiator can react to his colleagues' behavior by

i. ignoring them, or by

ii. reacting in terms of what their behavior means to him (interpret colleagues' behavior as offers), or by

iii. reacting in terms of what their behavior to them (interpret colleagues' behavior as demands).

The second assumption gives some propositional content to this three-fold classification. We hypothesize that, in our experiments, when a negotiator chose to ignore others, his behavior was primarily guided by his personality: certain personality types tended to be inclined to make generous concessions (their $b_0$ was close to 0), other types tended to be predisposed to make few if any concessions (their $b_0$ was close to 1). With respect to the second alternative, we hypothesize that whenever a negotiator reacted to others' behavior in terms of what their behavior meant to him and him only, he acted in accordance with the Siegel and Fouraker theory, i.e., if others' behavior was highly rewarding, he raised his level of aspiration, if it was unrewarding, he lowered it. Finally, with respect to the third alternative, we hypothesize that whenever the negotiator reacted to past behavior in terms of what it meant to the person who was the actor (whether it was himself or another negotiator), he acted in accordance with the Osgood's theory, i.e., he tended to reciprocate.

The third assumption is that it is perfectly possible for a negotiator to use all three alternatives at the same time. The basis of this assertion is the fact that own demands, others' offers as well as others' demands are all measurable (in our experiments) in money, money being (ideally at least) a continuous variable. As a result, it is always possible to determine -- in principle at least -- the negotiator's present demand from a combination of all three variables, by assigning coefficient $b_0$ to his own past demand, coefficients $b_1$, ..., $b_4$ to others' offers and coefficients $b_5$, ..., $b_8$ to others' demands. (We did not actually utilize coefficients $b_5$ ..., $b_8$ because in our experiments the subjects did not know what demands

their colleagues were actually making,[26] they had to guess at what they were. Hence the determination of variable $X_5$, ..., $X_8$ was not operationally possible, although it may be possible under different conditions).

The fourth assumption concerns the ordering of the three alternatives in terms of their influence upon the negotiation process. And we hypothesize that ignoring others' behavior was, in our experiments, the most prominent fact about the negotiation, reacting to others' demands a fact of second-rate importance, reacting to others' offers of least importance. Stated in operational terms, we, in part, merely repeat what we found, i.e., that variables $X_0$ alone accounted for much more variation in Y than did variables $X_1$, ..., $X_4$ jointly (Tables 5 and 6). In part, however, we are hypothesizing that, had we included variables $X_5$, ..., $X_8$(colleagues' demands) into our analysis, these variables would have jointly accounted for more of variation in Y than did variables $X_1$, ..., $X_4$, but less than did variable $X_0$.

Interpretation of the Findings.

If it is true (Assumption 4) that the tendency to interpret others' behavior in terms of what it means to them (their demands) is stronger that the tendency to interpret it in terms what it means to "me" (their offers), and if the analysis of the data takes into account only others' offers (as eq. (1) does), then the resulting reaction coefficients $b_1$, ..., $b_4$ will have to reflect both tendencies. If it is true, furthermore, that others' offers are reacted to as specified by the Siegel and Fouraker theory, and others' demands as specified by Osgood's theory (Assumption 2), then it follows that:

i. When the negotiators are allies, the two tendencies work in harmony,[27] producing an overwhelming majority of positive reaction coefficients (first column of Table 3).

ii. When the negotiators are opponents, the two tendencies are in conflict;[28] since, however, the tendency to react to opponents' demands is the stronger of the two tendencies, a slight majority of the reaction coefficients is negative (second column of Table 3).

Thus our theory helps us to explain the finding that two seemingly contradictory theories are both found to be true.

Now suppose that Assumptions 2 and 3 are true and that the behavior of a subject is almost exclusively determined by his personality, in other words, that the coefficient $b_0$ remains fixed. Then it is not difficult to see that, as we consider subjects with smaller and smaller tendency to make concessions (i.e., as we allow $b_0$ to vary from 0 to 1), the expected payoff increases up to a point and then either levels off or decreases, just as reported in Figure 1. Figure 2 suggests why this has to be so.

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Insert Figure 2 about here.

---

Consider, for simplicity's sake, two negotiators who are both guided by the same concession coefficients $b_0$, $b_0 = \frac{1}{2}$, and who both have $a = 0$ so that

$$Y_i = \tfrac{1}{2}X_i$$

Now suppose that both start with the same demand, $X_1^{(0)} = \$8$. It is not difficult to see that the series of demands will be as follows:

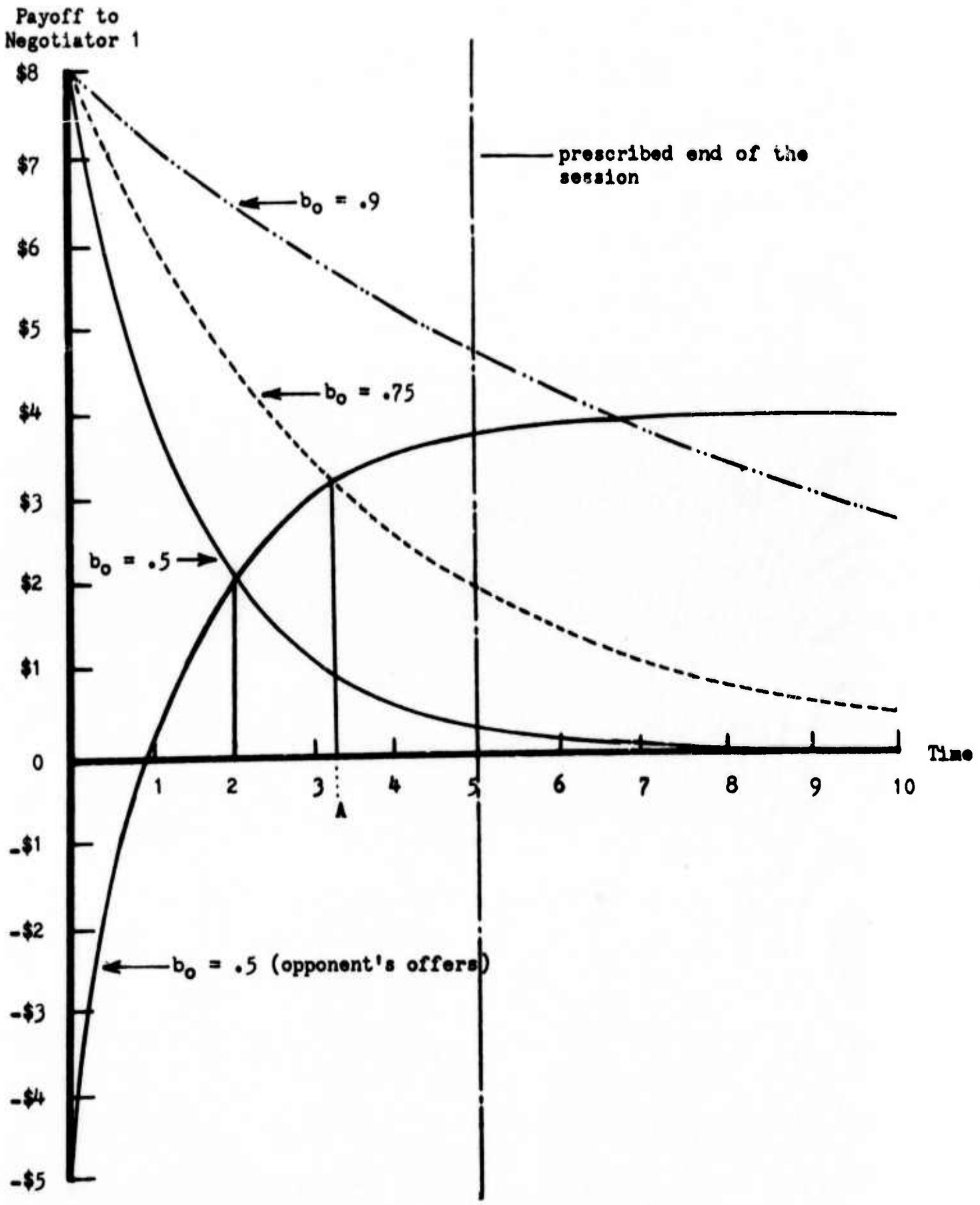


FIGURE 2. Relationship Between Concession-making and Final Payoff when Agreement has to be Reached in Prescribed Time.

| Time | 0 | 1 | 2 | 3 | 4 | 5 | ... |
|---|---|---|---|---|---|---|---|
| Demand | $8 | $4 | $2 | $1 | $.50 | $.25 | ... |

Now suppose that the two negotiators are natural opponents and that their two payoff functions, $v_1$ and $v_2$, are opposed in the following manner:

$$v_1 = -v_2 + 4$$

Using the above relationship, we can express all behavior in terms of what it means to negotiator 1, by "translating" 2's demands into offers to negotiator 1:

| Time | 0 | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|---|
| Demands by 1 | $8 | $4 | $2 | $1 | $.5 | $.25 | ... |
| Offers to 1 | -$4 | $0 | $2 | $3 | $3.5 | $3.75 | ... |

Figure 2 represents these two sequences of demands and offers by two solid lines, the demands by a curve that slopes downwards, the offers by a curve that slopes upwards. Notice that the two solid curves intersect at t=2, and that the payoff to negotiator 1, shown by the vertical line dropped from the intersect, is $2.

Consider what happens when negotiator 2's coefficient $b_0$ remains the same (so that his offers remain the same), but negotiator 1's coefficient increases to $b_0 = .75$. Then the demands and offers become

| Time | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Demands | $8 | $6 | $4.50 | $3.38 | $2.53 | ... |
| Offers | -$4 | $0 | $2 | $3 | $3.5 | ... |

The new demands by negotiator 1 are represented in Figure 2 by the broken line. Ignoring the fact that the demand and offer curves intersect between[29] time t=3 and t=4, we note that as $b_0$ increases, so does 1's final payoff; the vertical line at point A is longer than the vertical line at time t=2. We can see that, in general and as long as 2's $b_0$ remains constant, the less concessions 1 makes (the higher 1's concession coefficient $b_0$), the higher his payoff.

However, let us complicate matters by introducing a deadline by which the negotiations have to end. Again for simplicity's sake, let us assume that the negotiators are not allowed to go beyond five consecutive demands and offers, i.e., that the session has to end at time t=5. This prescribed termination is indicated by the dotted vertical line of figure 2. Now suppose that negotiator 1's concession coefficient $b_0$ is very high, that $b_0 = .9$. The demands of negotiator 1 under these conditions are easily computed and are represented by the -.-.-.-.- line. Notice that this new demand curve and the offer curve do not intersect in the alloted time (prior to t=5) -- in other words, that the two negotiators do not reach an agreement, and that the payoff drops to 0.

If, instead of assuming that the offers to 1 remain fixed, it is assumed that the offer curves themselves vary, perhaps so that the reaction coefficients $b_0$ of negotiators 2 are normally distributed around $b_0 = \frac{1}{2}$, then the empirical relationship between the concession-making and probability of agreement (as shown in Figure 1) is accounted for: as negotiator 1's reaction coefficients increase from being close to 0, the probability of agreement remains unchanged because agreement is likely to be reached very soon; however, as

$b_0$ increases further, the existence of the deadline begins to be felt (since to reach an agreement takes a longer and longer time) and the probability that the time needed is longer than the time allotted increases.

Given these considerations, it is clear that whether concession-making is a good policy depends very much on how much time the negotiators have: the less time they have, the better strategy concession-making is. It was something of a coincidence that in our experiments the subjects had plenty of time, so that the negative influence exercised upon payoff by the deadline was weaker than the positive influence exercised on it by the increasing $b_0$. Thus our interpretation of the finding that concession-making is an unprofitable policy has to be qualified: <u>had the subjects had much less time in which to reach an agreement, concession-making would probably have been a profitable strategy</u>.

<u>Applicability to "Real Life"</u>.

Whenever conclusions about human behavior are based on laboratory experiments, the inevitable question comes to mind: just how relevant are these findings for "real" life? The implicit assumption being, of course, that their relevance is small indeed.

There are several facts about our experiments and about our findings that suggest that the above objection should be given serious consideration. In our "abstract" experiments the proposals were mere numbers while in real negotiations the proposals have content such as "nuclear disarmament"; our payoff was money while in real negotiations there is a multiplicity of payoffs such as money,

prestige or friendship; our negotiators were college students while real negotiators are professionals; our negotiators were restricted in their speeches to making endorsements of one proposal, while in real life negotiators make speeches that are often vague, often are mere attempts to pressure others; and so on.

The possibility that these restrictions may materially alter the process of negotiation lead us to design and conduct the "spoken" experiments.[30] And, on the face value, our findings seem to suggest that the behavior of the subjects in the spoken experiments conformed to our model much less than did the behavior of subjects in the abstract experiments (Tables 3-6).

Before we jump to the conclusion, however, that the findings apply only to our highly restricted experiments, let us consider the case of the spoken experiments more carefully. Let us notethat, while it is true that the fit of eq. (1) to the spoken experiments was considerably smaller than the fit to the abstract experiments (18% in the spoken versus 31% in the abstract experiments)[31] and that the predicted trends did not occur with statistical significance for the spoken sessions (Tables 4 and 6), it is nevertheless true that the same trends were suggested in both types of experiments. In both types of sessions the percentage of positive reaction coefficients was larger among allies than among opponents (Tables 3 and 4) and in both types the influence of others upon own behavior was much smaller than the influence of own previous behavior (Tables 5 and 6). It appears, then, that the only fact that has to be accounted for is the decrease of predictive power when eq. (1) is applied to spoken experiments.

There was one important difference between the abstract and the spoken experiments that could be responsible for the difference in the goodness of fit: in the spoken experiments the subjects had to compute the payoff associated with combinations of proposals[32] while in the abstract experiments the payoff for every possible proposal was immediately known to the subject, without his having to resort to computations. It is perhaps clear that when a negotiator has to make calculations he is subject to making mistakes and thus may at times endorse a combination because he erroneously believes the payoff from that combination to be high. It is also clear, however, that this differences between the abstract and the spoken experiments has little to do with the difference between the experimental and the "real life" conditions, since a real negotiator -- precisely because he is an expert -- seldom makes a mistake about how much a given proposal or combination of proposals is worth to him.

These considerations suggest that further experiments can help to establish whether the better fit of eq. (1) in case of abstract experiments than in the case of spoken negotiations is an artifact. If we conduct abstract experiments in which the negotiators are allowed to agree on a combination of proposals and are required to compute the payoff from each possible combination, and if the goodness of fit in such experiments is low, then we are justified in holding that the low fit for the spoken experiments is primarily due to the artificial requirement that payoffs be computed. And our willingness to generalize our results to real life experiments would be greater than it is now.

Future Research.

In addition to the research into the reasons why the model fits the spoken experiments less than it fits the abstract experiments, there are two main problems that are suggested by our theory:

i. Is it in general true that the offers made by the colleagues have very little influence upon a negotiator's behavior?

ii. Is it true that the concession coefficient $b_0$ is fixed and determined by the negotiator's personality?

The first of these two problems calls for further investigation since it is contrary to so much of the prevailing thinking about negotiation. One tends to think, for example, that timing of a concession in international or labor-management negotiations is of utmost importance, that a concession made at a wrong time might wreck the prospects of an early settlement.[33] If it were true in general, as it was true in our experiments, that the negotiators have each a "time-schedule" of their own (determined by the coefficient $b_0$) and that they pay little attention to what the other side has to say, then much of our thinking would have to be revised. And the theory of negotiation would become quite simple, since the outcome would be largely dependent on only two variables, the concession coefficients of the negotiators and the deadline by which the agreement has to be reached, just as illustrated in Figure 2.

The second problem is of considerable importance for similar reasons as the first. For if it were true that the concession coefficient $b_0$ is fixed and depends largely on the personality of the negotiator, then, for any negotiation, by knowing the personalities

of the negotiators and by knowing the deadline, one could predict with some reasonable accuracy the outcome of the session. And, if such predictions were shown to be accurate in a sufficient number of cases, then perhaps some of the more costly and lengthy negotiations could be dispensed with, by using the predicted outcome as an arbitrated agreement.

Just how the first two problems could be studied is suggested by considering some of the reasons why our experiments may be different from many of the "real life" negotiations. In the abstract experiments, the subjects quite frequently made as many as 200 "speeches" each, while in international or labor-management negotiations the number of new proposals that each side presents is often quite small. Thus one profitable line of inquiry could consist in studying what happens in the abstract experiments when the number of speeches each negotiator can make is severly limited. Would a given negotiator have the same $b_0$ in experiments with a generous time-allotment as in the experiments with very little time allowed? Would he not pay more attention to others if the time alloted was short?

But one should be alert to the possibility that our findings are not an artifact, but rather are something that one would find in all negotiations that involve many participants. Is it not possible that, when one has four colleagues, the amount of information received becomes so overwhelming that one is unable to handle it and thus comes to ignore it? Thus one type of relevant research would investigate systematically the difference in the reaction coefficients $b_j$ as the size of the negotiation group increases from two to, say five.

In addition to the above possiblities, one obvious approach to the second problem is to determine whether a negotiator who participates in different groups (and thus faces colleagues with different concession coefficients $b_0$) tends to have the same $b_0$ in all of them, and, if so, whether this coefficient is related to any of the standard personality measures. A preliminary analysis of the data gathered in our experiments suggests that the answer to both questions may be yes: the negotiator who had a high concession coefficient in one experiment was likely to have a high coefficient in another session also, and the coefficient appears significantly related to the "Achievement Potential and Intellectual Efficiency" scales of the California Psychological Inventory.[34]

## Footnotes

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**The author wishes to express his thanks to William B. Devall and Wilberta Woodson who assisted him in conducting the experiments and analyzing the data.

1 For a good bibliography see R. Duncan Luce and Howard Raiffa, Games and Decisions, New York: Wiley, 1958.

2 For a recent and excellent case study see Ann Douglas, Industrial Peacemaking, New York: Columbia Press, 1962.

3 The works by Siegel and Fouraker are pioneering in this area: Sidney Siegel and Lawrence E. Fouraker, Bargaining and Group Decision Making, New York: McGraw-Hill, 1960,

Lawrence Fouraker, Sidney Siegel and Donald L. Harnet, Bargaining Behavior, Vol. 1 and 2, University Park, Penn.: mimeographed reports, 1961.

4 The various economic models of bargaining have often made assumptions about concession making. For example, Fellner argues that negotiated price will be determined, among other things, by the "toughness" of the negotiators, i.e., their willingness to make concessions (Siegel and Fouraker, op. cit., p. 11).

5 The model of bargaining stated by Siegel and Fouraker, (op. cit., pp. 90-95) includes an index of concession-making as a variable of the model.

6 Ibid., pp. 76-82.

7 The view that reciprocity helps to stabilize social relationships is also expressed by Alvin W. Gouldner in "The Norm of Reciprocity: A Preliminary Statement," American Sociological Review, 25 (April 1960), 161-178. However, since Osgood's ideas apply more directly to the problems of negotiation, the contention that negotiators tend to reciprocate concessions will be called the "Osgood" hypothesis.

8 Lewis F. Richardson, Arms and Insecurity, Pittsburgh: Boxwood Press, 1960.

9 See p. 7 ff.

10 Ibid., pp. 61-70.

11 The great majority of the Siegel-Fouraker experiments ended in an agreement because the subjects were allowed to extend the negotiation period by one hour if they could not reach an agreement within the alloted one hour.

12 The fictitious names used in the experiments were adopted from Harold Guetzkow, Structural Programs in Relation to Free Activity within the International Simulation, Evanston: Northwestern U., Unpublished Manuscript, 1961.

13 The desks were so designed that a negotiator could not see the payoff sheets used by others in his group.

14 See p. 5 above.

15 The multiple regression analysis routine BIMD 29, and the IBM 7040 computer were used for the computations.

16 There were no 0 coefficients.

17 See "Discussion" below.

18 The demands by and offers to a given negotiator were transformed into Z-scores, so that, for example, a given demand would be

expressed in terms of standard deviations from the mean of all demands and offers associated with that negotiator. In this way the effect of the different payoff functions was controlled for.

19 For the discussion of variance (or variation) "explained" by a coefficient of correlation see, for example, Hubert M. Blalock, Social Statistics, New York: McGraw-Hill, 1960, pp. 295-299.

20 Blalock suggests that a regression equation should explain at least about 50% of the variation to be of practical use. However, he states, "most correlations in the social science are considerably less [than needed for the 50% norm] " (ibid., p. 299).

21 Meaning: when variables $X_1$ , ..., $X_4$ are controlled for.

22 Meaning: when variable X is controlled for, the multiple-partial coefficient is $r^2_{Y(1234).0} = .03349$. For a discussion of the multiple-partial coefficient see Blalock, op. cit., pp. 350-1.

23 See the section entitled "Discussion".

24 Among other measure considered was the regression coefficient between time and demand, $b_{td}$. However, this measure suffers from the fault of not taking into account the first demand the negotiator makes. Thus, for example, if the negotiator starts the session by making a very low demand and then remains on that level, then $b_{td} = 0$, indicating that the negotiator made no concessions -- when in fact he made a considerable concession on his very first demand.

25 The mean demand and final payoff were transformed into Z-scores, so that, for example, the mean demand characteristic of negotiator i was expressed in terms of standard deviations from the "grand mean demand", i.e., the mean computed from all the demands

made by negotiators using the same payoff function. Thus the efficts of different payoff functions was controlled for.

26 See the description of the experimental design, p. 9.

27 Since making high demands means, automatically, making high offers to the ally.

28 Since making high demands means, automatically, making low offers to the opponent.

29 A more complete model than that given by eq. (1) would spell out what happens when the point of agreement fails to correspond with any one of the time-periods t.

30 See the section entitled "Experiments", pp. 7-10.

31 See Tables 6 and 5.

32 As shown in Table 2, a negotiator was given only the payoffs associated with the five "basic" proposals.

33 See, for example, Ann Douglas, op. cit.

34 These data will be presented in a forthcoming publication.